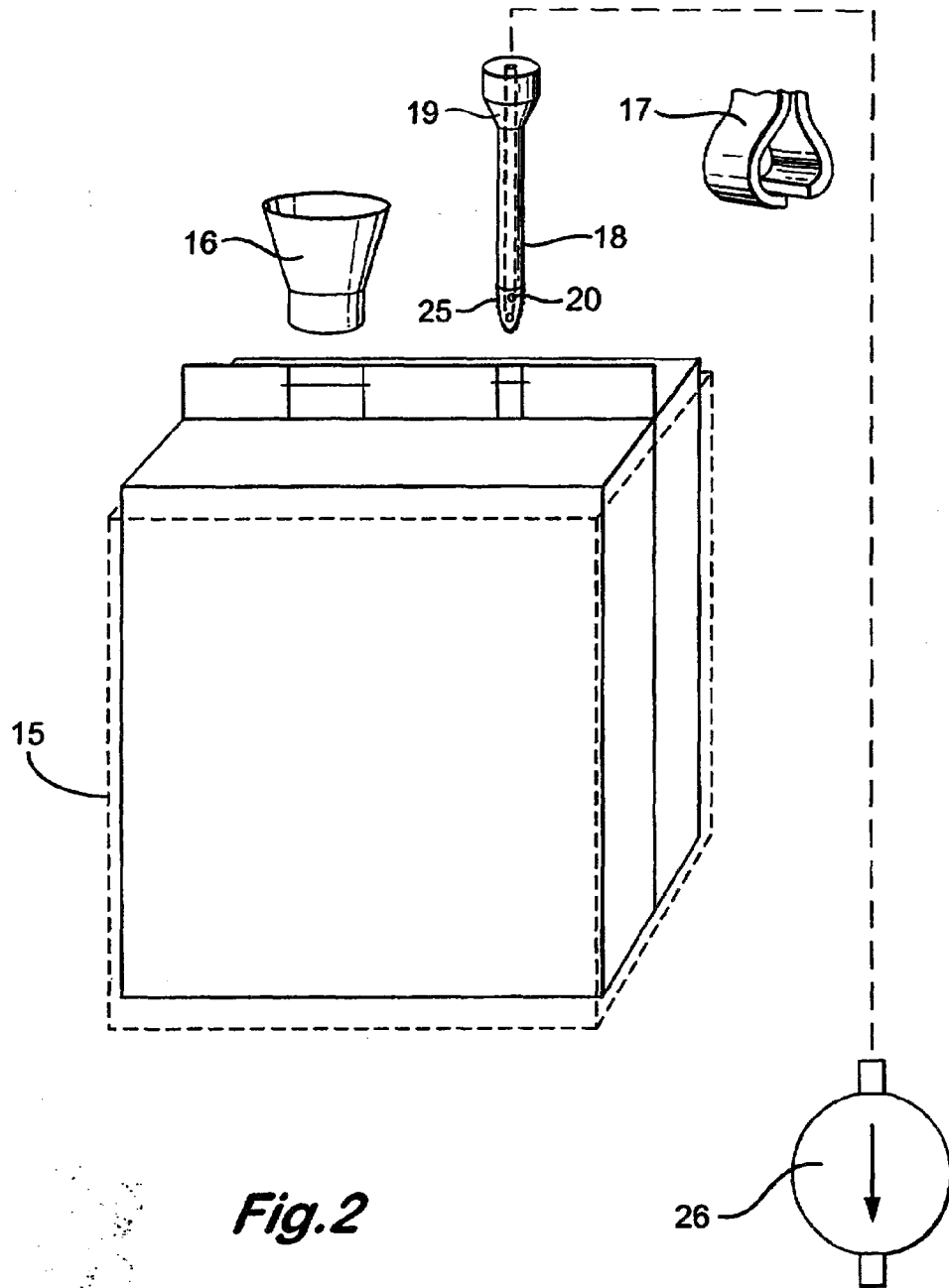
**Fig. 1**



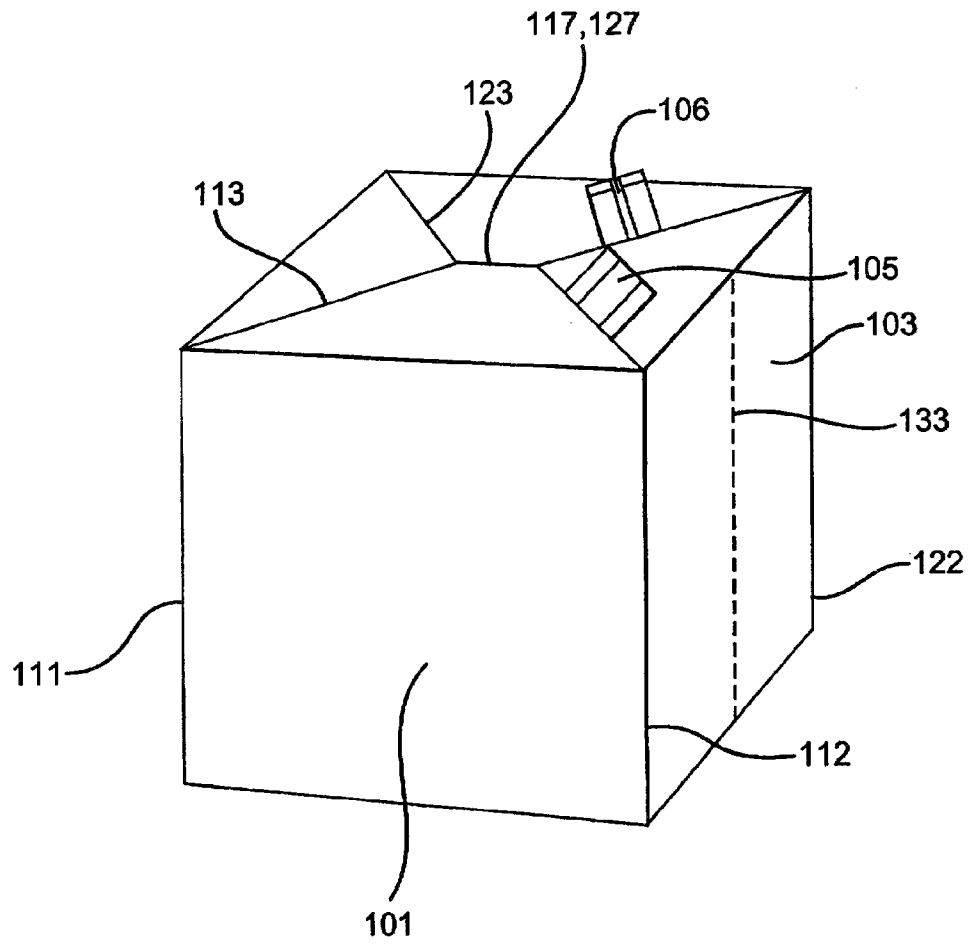


Fig. 4

AGRICULTURAL PRODUCE CONTAINER

The present invention relates to packaging of agricultural produce, particularly, but not exclusively, tea.

5

Traditionally, tea was packaged in tea chests, that is to say wooden chests lined with metal foil to preserve the tea from becoming damp. Now, tea is packed in paper bags or sacks, having several paper layers and including a foil layer.

10

The reason for the foil in the packing is that tea is hygroscopic and spoils if it becomes too moist. Indeed it is usually dried to a greater extent – c. 2.5 to 3.5% moisture – than it should be to produce its best flavour, in order to ensure that it arrives in Europe from Africa at a maximum of 5% moisture.

15

Vacuum packaging of tea is little practised, due to the difficulty of providing sophisticated vacuum packaging equipment on tea growing estates.

The object of the present invention is to provide a bag or sack for simplified vacuum packaging of tea and other dried crops.

20

According to the invention there is provided a container of plastics material and foil laminate, the container having a first opening and a narrower, second opening, the first opening being for filling the container with dried crop and subsequent heat sealing and the second opening being for evacuation of air from the container and the crop by means of a probe inserted therethrough and subsequent heat sealing, the two openings being between at least two webs of the laminate.

25

Preferably, the first opening is narrow in comparison with the filled size of the container.

30

Further it is preferred for the first opening to be narrow at least in a laid flat configuration in comparison with the laid flat configuration of the container prior to filling.

Usually the first opening will be less than half the laid flat width of the container, and conveniently the first opening is openable to a width greater than its laid flat width. The opened width will conveniently be greater than half the laid flat width of the container.

5

Typically, the container will have a width when flat of the order of half a metre, whilst the first opening has a width of 100mm to 300mm, preferably 180mm \pm 20mm, and the second opening has a width of 7mm to 50mm, preferably 20mm \pm 5mm.

10

The container can be of polyethylene or other heat sealable plastics material film(s) on the inside and other plastics material on the outside, such as nylon and polyester films, laminated to both sides of an aluminium foil or other high barrier material. This material is readily heat sealable and is significantly more impermeable to moisture than a simple polyethylene film.

15

In use, the container is inflated, preferably in a former having the intended inflated shape. The dry crop is poured into the container via the first opening. Once the container is filled, the first opening is heat-sealed. A probe is inserted through the second opening and into the body of the crop. Vacuum is applied to draw the air within the container out from it. Once the container is evacuated, the probe is withdrawn. The second opening collapses, temporarily sealing the second opening. This is permanently sealed by heat sealing.

20

Normally the container will be formed of two main sheets, with two folded sheets therebetween at the edges. To form a generally cuboid container, the main sheets have a generally hexagonal shape, with the folded sheets also being generally hexagonal when flat.

25

Preferably, the hexagonal shape is extended at one edge by a flap of two thicknesses having one or both the openings therein. In the preferred embodiment, there are two such flaps, one having one opening and the other the other.

30

In another embodiment, the container is of two Z-folded sheets, each having a gusset formed by the central Z limb and one of the distal limbs and an extension of the other of the distal limbs, the two sheets being heat sealed together at respectively opposite distal, longitudinal edges, the wider opening being formed at one gusset,
 5 which is openable to increase the opening from its laid flat width, and the narrower opening being formed between opposed sheets between the gussets.

Alternatively, the container is of one unfolded sheet and one back-to-back-Z-folded sheet, the latter providing a pair of oppositely directed gussets formed by the
 10 central Z limbs and the distal limbs, the two sheets being heat sealed together at respectively opposite distal, longitudinal edges, the wider opening being formed at one gusset, which is openable to increase the opening from its laid flat width, and the narrower opening being formed between opposed sheets between the gussets.

15 Preferably the narrower opening is a formed as a foldable tail, able to be folded against an adjacent part of the container.

To help understanding of the invention, two specific embodiments thereof will be described by way of example and with reference to the accompanying drawing, in
 20 which:

Figure 1 is a side view of a first container according to the invention, laid flat; the container is shown partially cut away to illustrate otherwise hidden features;

Figure 2 is a perspective view of the first container when inflated;

Figure 3 is a view similar to Figure 1 of a second container according to the
 25 invention;

Figure 4 is a perspective view of the second container when inflated; and

Figure 5 is another view similar to Figure 1 of a third container of the invention.

30 Turning first to Figures 1 and 2, the container there shown is comprised of front and back rectangular sheets 1,2. The sheets can be of a single extrusion or be seamed longitudinally. Each sheet has long edges 11,12; 21,22 and short edges 13,14; 23,24. Between the long edges 11,21 and 12,22, folded sheets 3,4 are arranged, the adjacent sheets being sealed along the four long edges, which become the four corners

of the inflated container. The bottom short edges 23,24 are sealed completely across; whilst the top short edges 13,14 are also sealed across, except at openings 5,6. These are both narrow in comparison with the width of the container, with the opening 6 being narrower than the opening 5. The top seal 7 is discontinuous at the openings.

5 Additional seals 8 transversely of the seal 7 extend along the edges of the openings.

In use, the container is placed in a former 15 and inflated via the wider opening 5. A funnel 16 is placed in the opening and tea is poured in and the container filled. Heated tongs 17 are used to seal the opening.

10

A suction probe 18 is then placed in the smaller opening. It is dimensioned to pass freely into the opening and has a tapered shank 19, whereby it can tightly fit the orifice of the opening. The front end of the probe is tapered with apertures 20 opening into its hollow interior. A fine mesh gauze 25, such that tea cannot pass into the probe, covers the apertures. A vacuum pump 26 is connected to the probe. The latter is of a length to extend into the tea in the container. As the pump is operated, air is drawn from the container. It collapses against the tea, with the sheet material at the opening 6 closing against the probe itself. When the pump can extract no more air, the probe is withdrawn. The opening 6 collapses against itself and can be sealed

20 with the tongs 17.

Referring now to Figures 3 & 4, the container there shown has front and back hexagonal sheets 101,102. The hexagonal shape is not that of a regular hexagon, firstly, because it has truncated ends and, secondly, the angled sides are of a length to form half the diagonal of a cuboid based on the length of the long sides and their spacing. Each hexagonal sheet has two long edges 111,112; 121,122, four angled edges 113,114,115,116; 123,124,125,126 and two truncated edges 117, 118; 127,128. Between the long edges and the adjoining angled edges, folded sheets 103,104 are arranged. The adjacent sheets are sealed together along the long and the angled edges. The folds 133, 144 of the folded sheets coincide with the ends of the angled edges. Between these ends, the front and back sheets are sealed to each other along the truncated edges.

25

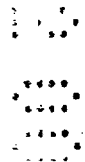
30

At the angled edges 114; 124, both the front and the back sheets and the folded sheet have extension flaps 151, 152, 1531, 1532. These are sealed around their respective edges in continuation of the seals S. The flaps 151, 1531 have an opening 105, with inwards directed seals 105S defining the width of the opening. Similarly the flaps 152, 1532 define a narrower opening between seals 106S. The seals 105S may not be required, the width of the opening 105 being defined by the interruption in the peripheral seal S. The opening may in fact be substantially the full width of the flaps 151, 1531.

This container is used in an exactly analogous way to the container of Figure 1. It is inflated in a former and filled with tea via the opening 105, which is then sealed. The container is then evacuated via the opening 106, which is then sealed.

It will be noted that the flaps fit behind the angled edges of a preceding container when these are produced in line from rolls of their constituent material.

Turning now to Figure 5, a third container 201 is shown in lay flat form. It comprises a unfolded sheet 202 and a back-to-back-Z-folded sheet 203. The latter has a central web 204 and two inwards Z-folds providing a central Z limb sheets 206, 207 and distal limb sheets 208, 209. The edges of these are sealed to the edges of the unfolded sheets, to form gussets 210, 211. The bottom edge of the container is conventionally sealed, straight across 212 and obliquely 213 to assist regular opening for filling. The top edge is sealed across to close one gusset and cut short 214. Centrally a narrow opening 216 is provided by sealing the unfolded sheet 202 to the central web 204. The opening is formed as a tail 205 by cutting from another seal 215 of the two sheets to the free edge 217. Thus the other opening 218 is formed. When this is in laid flat form, its mouth is less than half the width of the container. However, when the gusset 211 is pulled out as shown in outline, it extends to more than half the laid flat width.



In an alternative, a pair of Z-fold sheets, with one long distal limb, can be laid together to provide a similar formation.

The containers are suitable for vacuum packaging of agricultural produce from remote areas, where facilities are limited, the produce requiring to be transported free of moisture.

CLAIMS:

1. A container of plastics material and foil laminate, the container having a first opening and a narrower, second opening, the first opening being for filling the container with dried crop and subsequent heat sealing and the second opening being for evacuation of air from the container and the crop by means of a probe inserted therethrough and subsequent heat sealing, the two openings being between at least two webs of the laminate.
2. A container as claimed in claim 1, wherein the first opening is narrow in comparison with the filled size of the container.
3. A container as claimed in claim 2, wherein the first opening is narrow at least in a laid flat configuration in comparison with the laid flat configuration of the container prior to filling.
4. A container as claimed in claim 3, wherein the first opening is less than half the laid flat width of the container.
5. A container as claimed in claim 3 or claim 4, wherein the first opening is openable to a width greater than its laid flat width.
6. A container as claimed in claim 5, wherein the first opening is openable to a width greater than half the laid flat width of the container.
7. A container as claimed in any preceding claim, wherein the container is of two Z-folded sheets, each having a gusset formed by the central Z limb and one of the distal limbs and an extension of the other of the distal limbs, the two sheets being heat sealed together at respectively opposite distal, longitudinal edges, the wider opening being formed at one gusset, which is openable to increase the opening from its laid flat width, and the narrower opening being formed between opposed sheets between the gussets.
8. A container as claimed in any one of claims 1 to 6, wherein the container is of one unfolded sheet and a back-to-back-Z-folded sheet, the latter providing a pair of oppositely directed gussets formed by the central Z limbs and the distal limbs, the two sheets being heat sealed together at respectively opposite distal, longitudinal edges, the wider opening being formed at one gusset, which is openable to increase the opening from its laid flat width, and the narrower opening being formed between opposed sheets between the gussets.
9. A container as claimed in any preceding claim, wherein the container has a generally hexagonal lay flat shape and a cuboid filled shaped.

10. A container as claimed in claim 9, wherein the hexagonal shape is extended at one edge by a flap of two thicknesses having one or both the openings therein.
11. A container as claimed in claim 10, including two said flaps, one having one opening and the other the other.
- 5 12. A container as claimed in any one of claims 1 to 7, wherein the lay flat shape is generally rectangular.
13. A container as claimed in any preceding claim, wherein the narrower opening is a formed as a foldable tail, able to be folded against an adjacent part of the container.
- 10 14. A container as claimed in any preceding claim, wherein the laminate is of polyethylene or other heat sealable plastics material film(s) on the inside of the container and other plastics material on the outside, such as nylon and polyester films, laminated to both sides of an aluminium foil or other high barrier material.
- 15 15. A filled container, the container being as claimed in any preceding claim filled dried crop and substantially evacuated of air, the two openings being heat sealed.
16. A method of filling a container as claimed in any one of claims 1 to 13, the method consisting in the steps of:
- filling the container by pouring a dry crop via the first, wider opening,
 - heat-sealing the first opening,

20 • inserting a probe through the second, narrower opening and into the body of the crop,

 - substantially evacuating air from the container via the probe,
 - withdrawing the probe and
 - heating sealing the second opening.
- 25 17. A method as claimed in claim 16, wherein container is preliminarily inflated into its intended shape, preferably in a former, prior to filling with the dry crop.
18. A container substantially as hereinbefore described with reference to Figures 1&2 or Figures 3&4 or Figure 5 of the accompanying drawings.
19. A filled container substantially as hereinbefore described with reference to
- 30 Figures 1&2 or Figures 3&4 or Figure 5 of the accompanying drawings.
20. A method of filling a container substantially as hereinbefore described with reference to Figures 1&2 or Figures 3&4 or Figure 5 of the accompanying drawings.



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Claims searched: All

Examiner: Geoff Nicholls
Date of search: 18 May 2001

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.5): B8C (CU10 CF12) B8K (KFD)

Int Cl (Ed.7): B65B 1/26 1/28 31/02 31/04 31/06

Other: ONLINE: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2297304 A (RICOH) Whole document relevant	1 to 4, 12
A	GB 1475453 (E-Z-EM)	
A	EP 0122864 A1 (FAGNIART)	

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